University of California, Berkeley
Physics 110B Spring 2001 Section 1 (*Strovink*)

Problem Set 3

1. Griffiths 10.3.

2. Griffiths 10.5.

3. Griffiths 10.7.

4. Griffiths 10.10.

5. Griffiths 10.13.

6. Griffiths 10.14.

7. Griffiths 10.20.

8. Consider two electrons each traveling with constant velocity $\beta c\hat{z}$ in the $\hat{z}$ direction, separated by a distance $\hat{x}b$ perpendicular to the $\hat{z}$ direction.
(**a**) Working in the electrons' mutual rest (*) frame, find the force F_x^* with which one electron repels the other.
(**b**) Using the fact that $\Delta p_x^* = \Delta p_x$ is a Lorentz invariant, but $\Delta t^* = \sqrt{1-\beta^2}\Delta t$ is not, find the force F_x of repulsion between the two electrons as evaluated in the lab frame.
(**c**) As an alternative to the approach (a)+(b), work directly in the lab frame. Using Griffiths Eqs. (10.65-10.66), evaluate the electromagnetic fields created by one electron at the position of the other. Use these fields to evaluate the force of mutual repulsion, and compare your answer to (b).